POWER^n

High Precision Construction and Reduced Overnight Cost and Schedule

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Recent Experience in Nuclear Construction

VC Summers, SC, USA

(2008): Two 1,100 MW AP1000 pressurized water reactors originally projected to cost $9.8B.

(2017): Westinghouse files for bankruptcy. Latest estimate: $23B

Plant Vogtle, GA, USA

(2005): Unit 3&4 originally projected to cost $14 billion.

(2023): Latest estimate: $30B

Flamanville, France

(2007): Unit 3 originally projected to cost €3.3B.

(2023): Latest cost estimate: €13B

Source:
https://www.dw.com/en/finlands-much-delayed-nuclear-plant-launches/a-61108015
https://www.neimagazine.com/news/newsedf-confident-fuel-loading-at-flamanville-3-will-begin-in-2023-9788731
https://www.ans.org/news/article-3573/another-delay-cost-bump-for-flamanville3/
https://www.chooseenergy.com/news/article/failed-v-c-summer-nuclear-project-timeline/c

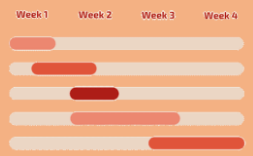
Recent Experience in Nuclear Construction

- Construction plans and schedules not reflective of on-site reality;
- Project management integration is poor. Approvals of changes through paperwork between construction supervisors, inspectors, decision makers, regulators, and owners.
- Lack of communication and information flow at all levels. Very slow pace and lack of understanding of the real issue at all stages.
- Mismatch in as-design and as-built & **compatibility of modular components**;
- Lack of real-time info for oversight;
- **Incomplete & missing inspection records**

Construction Performance Modeling and Simulation (CPMS)

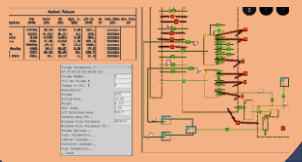
- Project Management
- Design Changes
- Construction
- Inspection Requirements
- Accelerated Licensure

Scheduling

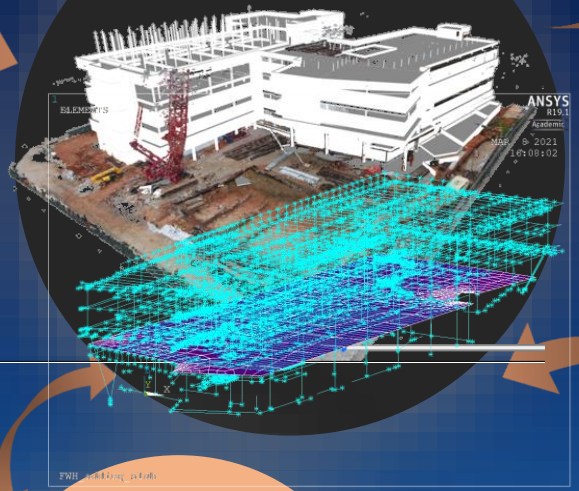


Regulatory Approvals and Licensing

As-Built Models

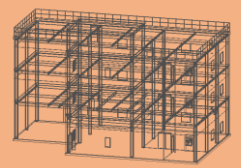


CPMS

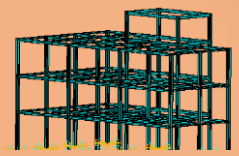


Reality Capture

BIM

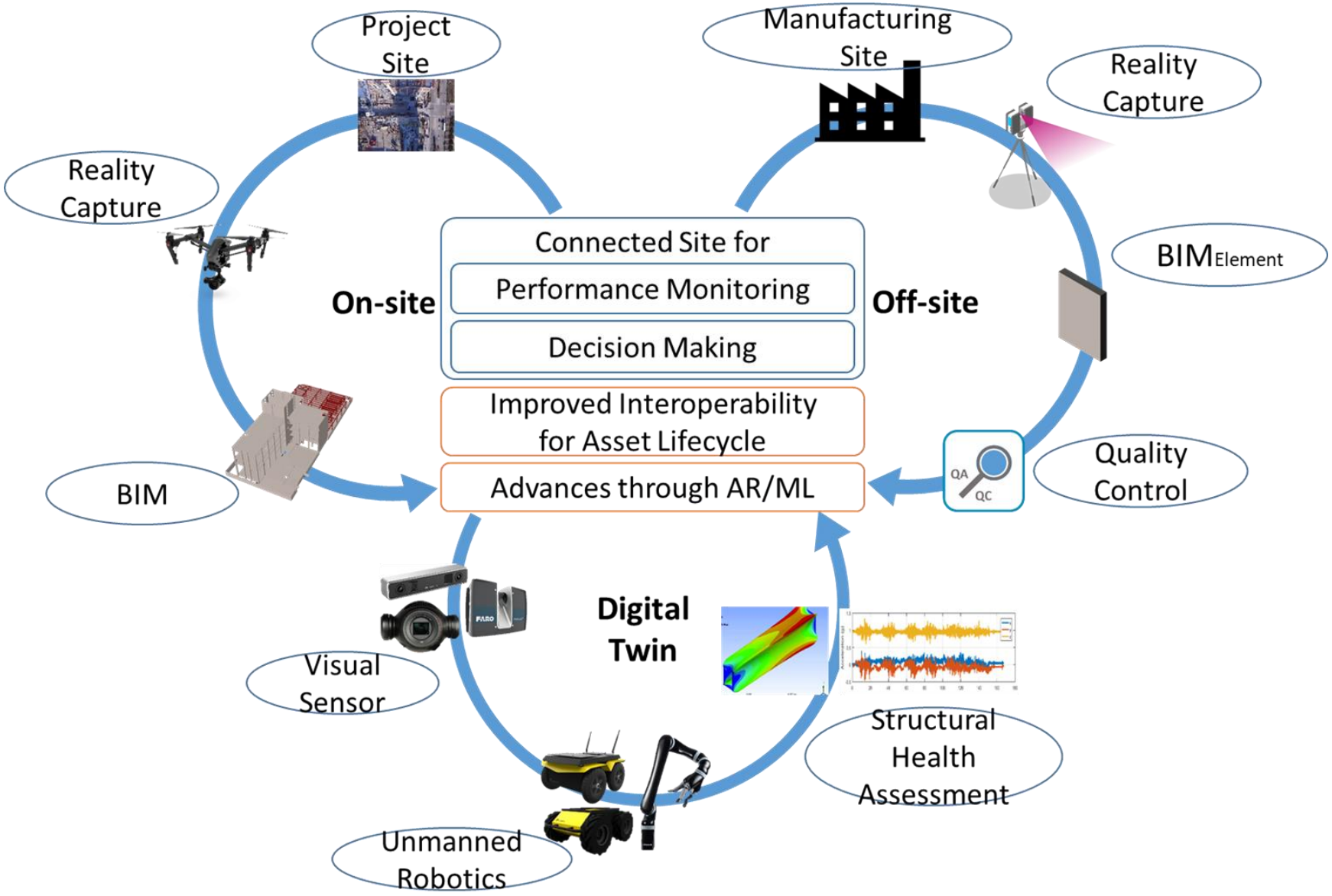


FEA

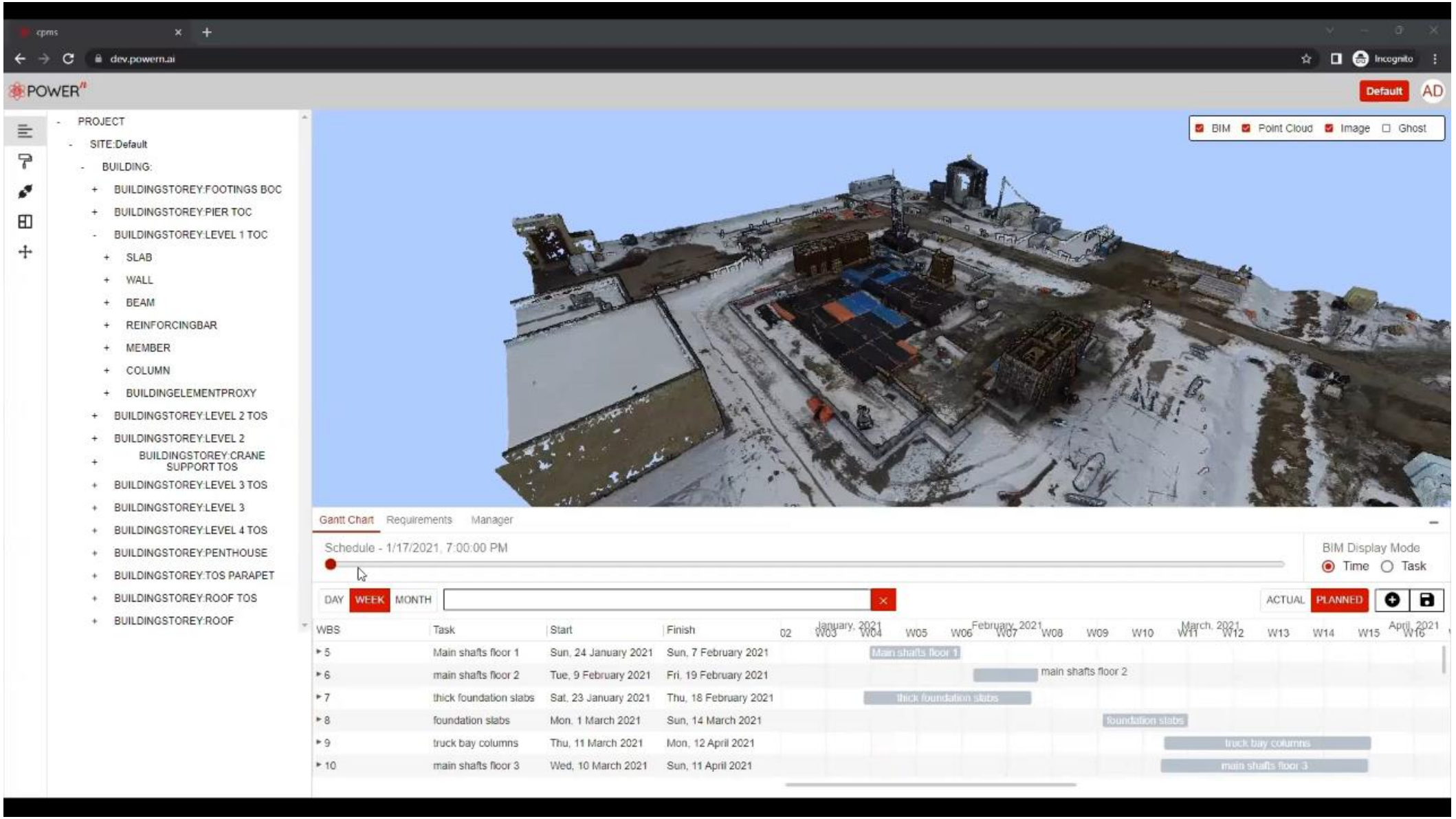


Asset Req' Management

Holistic Approach to Performance Management at Project Site and Off-Site Facilities

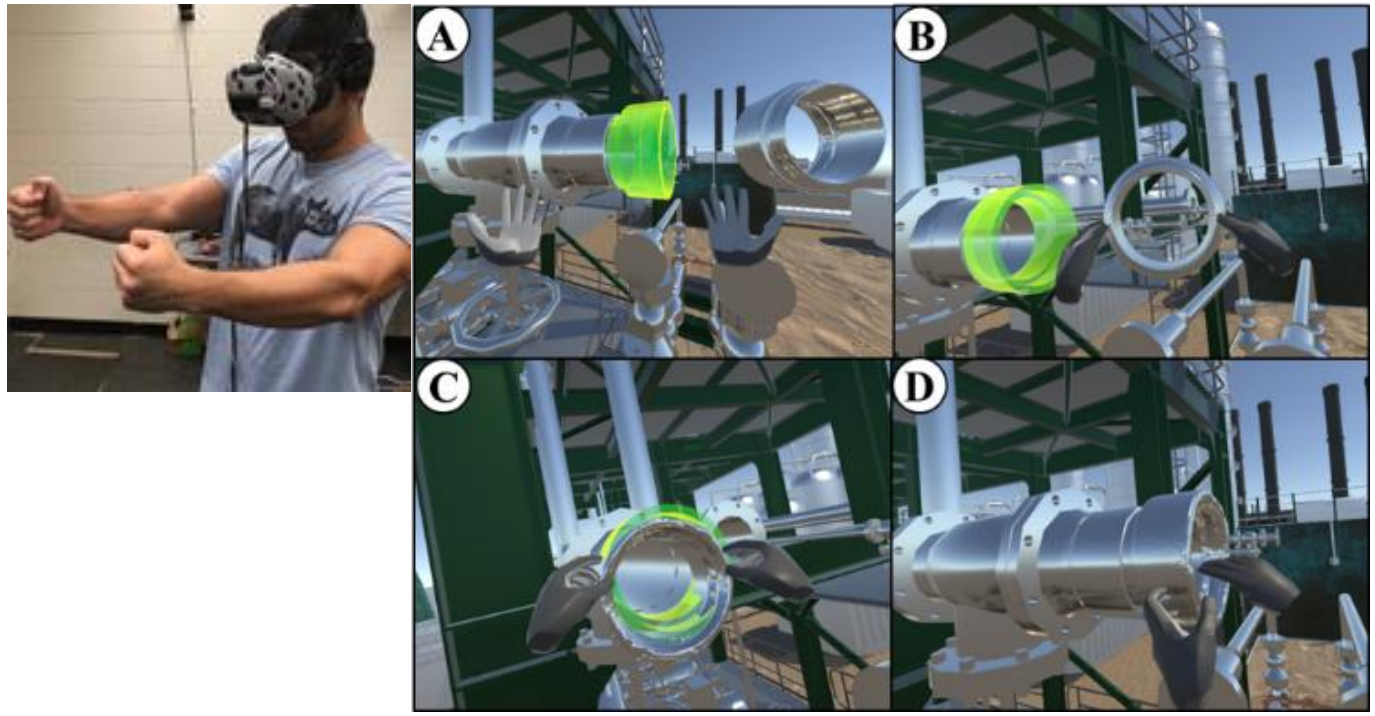


Virtual Platform for Performance Monitoring & Simulation



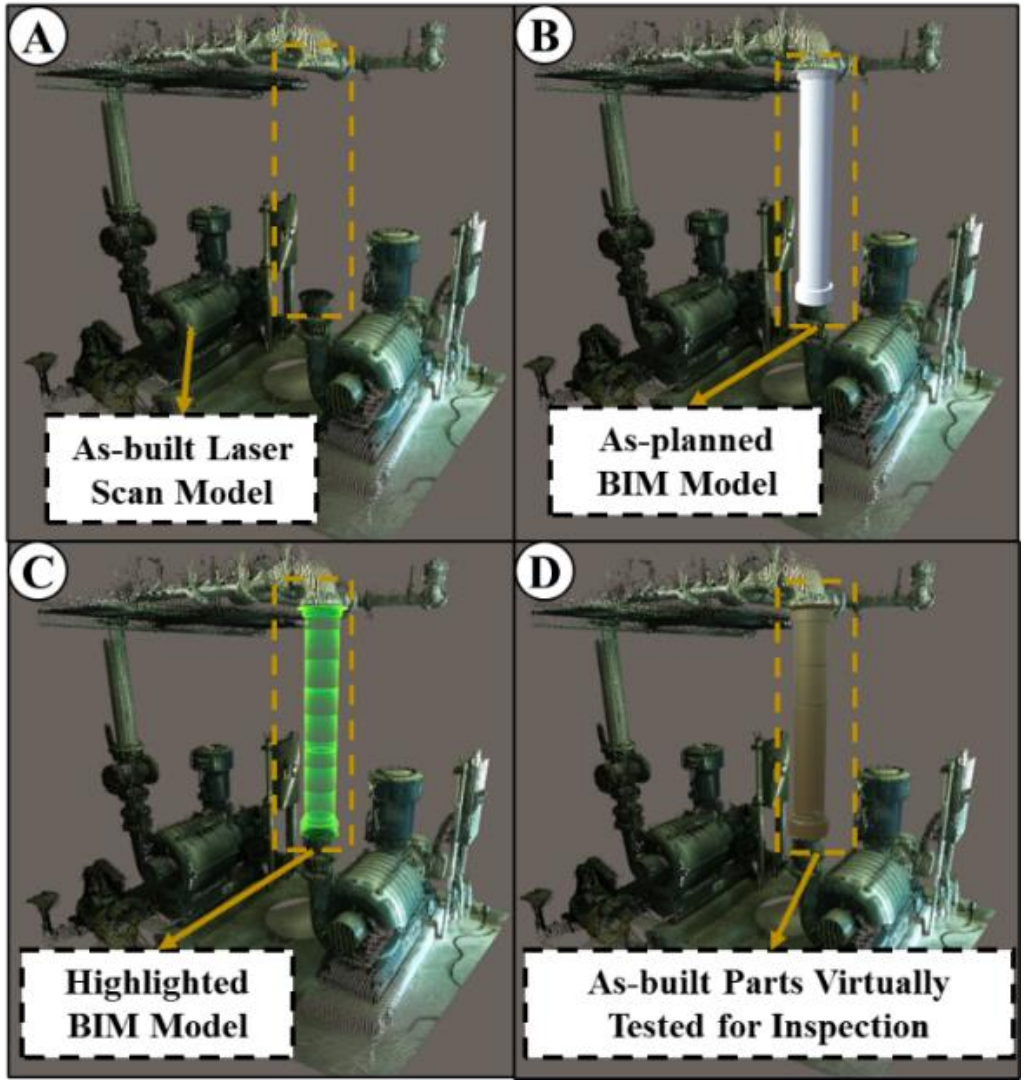
VR for Virtually Managing QA/QC in Supply Chain

Manual Virtual Inspection



- Retrofitting SMR to existing refinery/coal plant
- Replacement of old generator

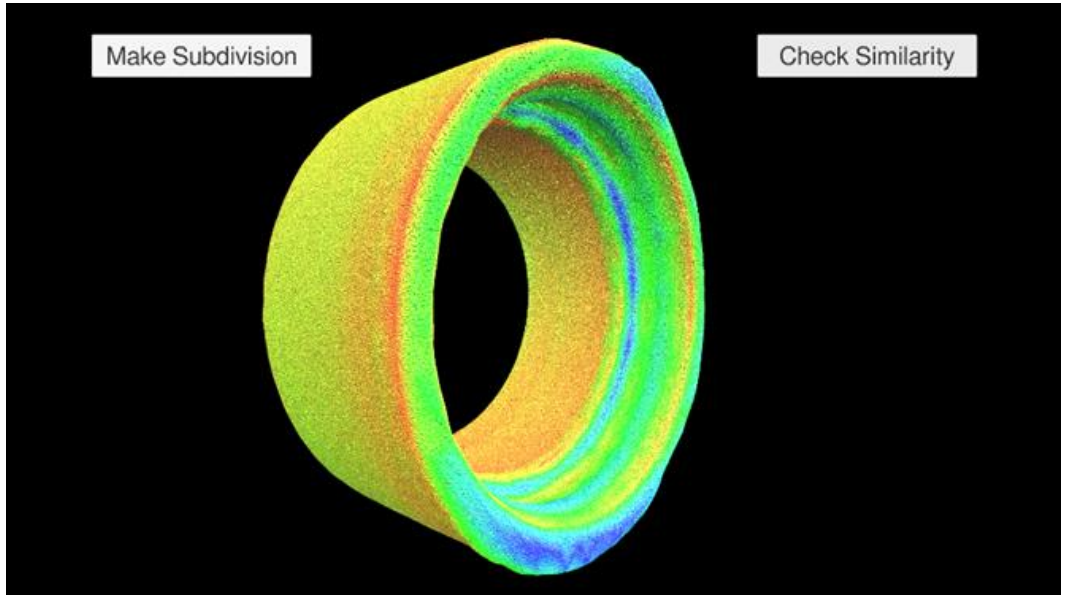
Automatic Virtual Inspection



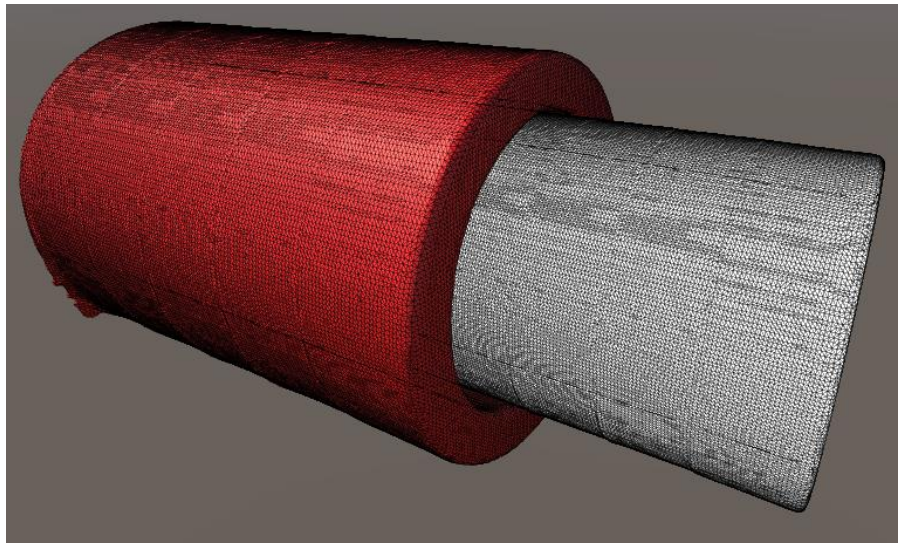
Compatibility Check (also for Microreactor)

- Comparison between design and as-built models
- Compatibility check between two modular components

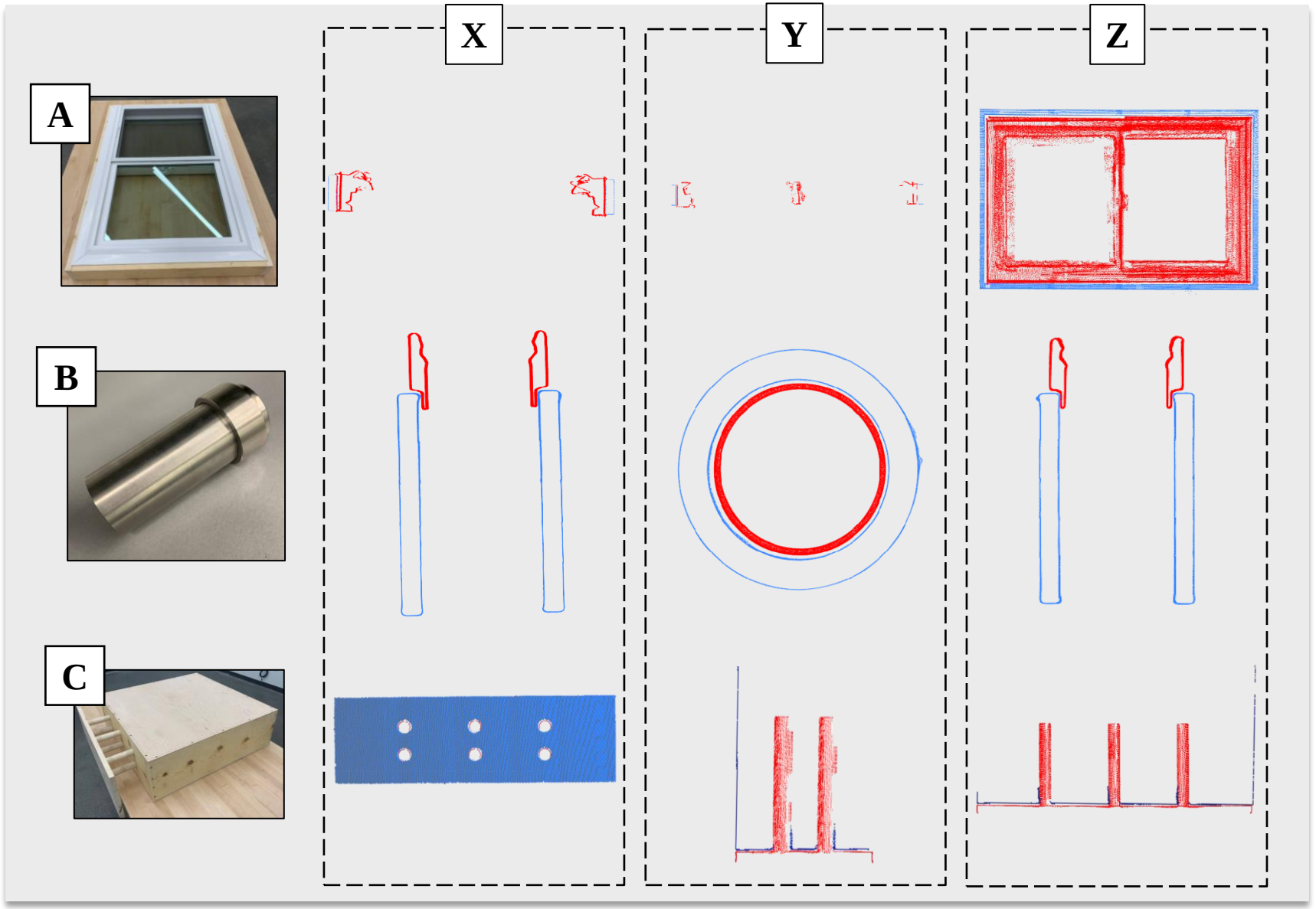
As-built to as-planned comparison



As-built to as-built comparison

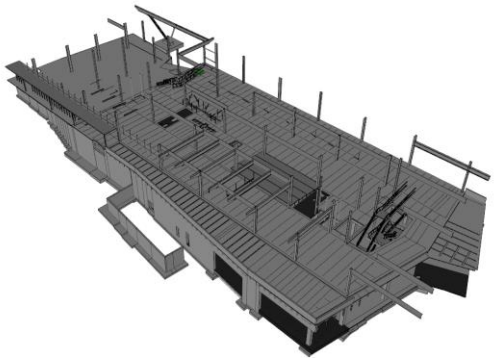


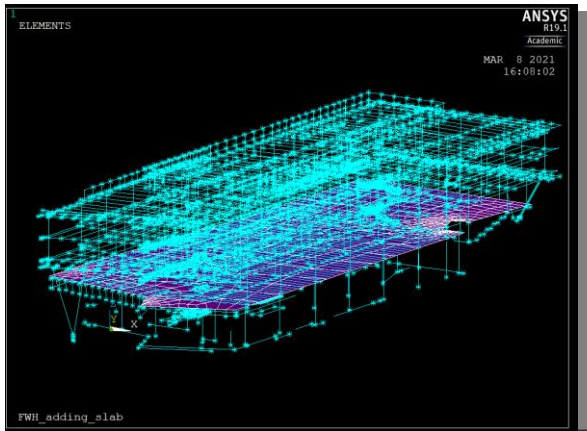
Compatibility Check (also for Microreactor)

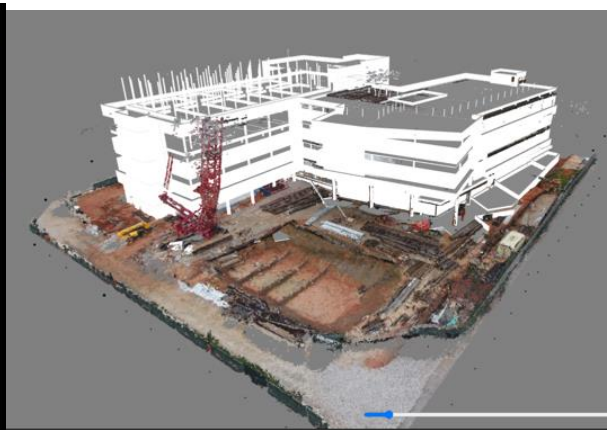


Case Studies

- Plant Sciences Building at NC State
  - CPMS
- Sample Prep Lab at INL
  - CPMS and compatibility check
- Structural specimen at Constructed Facilities Lab
  - Automated scanning using unmanned vehicles
- Fitts-Woolard Hall at NC State
  - BIM-to-ANSYS interoperability for building-piping interaction







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- DPR Construction
- Skanska Construction

U.S. DEPARTMENT OF ENERGY

Questions?

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